CineECG for ECG Analysis

Announcer: Welcome to Mayo Clinic's ECG Segment: Making Waves, Continuing Medical Education podcast. Join us every other week for a lively discussion on the latest and greatest in the field of electrocardiography. We'll discuss some of the exciting and innovative work happening at Mayo Clinic and beyond with the most brilliant minds in the space and provide valuable insights that can be directly applied to your practice.

Dr. Kashou: Welcome to Mayo Clinic's ECG segment, Making Waves. We're so glad you could join us. Today, we have a fascinating episode, as we look at a novel ECG form called CineECG. We have the expert and inventor himself joining us today. He's gonna help us better understand what this actually is. The standard 12 lead ECG remains essential to the practice of modern medicine. The ability to detect structural heart disease, acute myocardial injury, and rhythm abnormalities are important in clinical care. However, like any other diagnostic test, it has its own imperfections. Today, we are going to look at a new ECG solution, called CineECG, that allows us to visualize the temporal spatial cardiac activation and recovery pathways from a standard 12 lead ECG. We're fortunate to have Dr. Peter Van Dam here with us today to discuss this topic further. Dr. Van Dam is Co-founder and Chief Scientific Officer of ECG Excellence, a Dutch company specialized in developing solutions to make 12 lead ECG interpretation better and easier for both non-expert ECG physicians and expert ECG readers. Dr. Van Dam started his career at Vitatron, which was a European pacemaker manufacturer and now part of Medtronic. He left Medtronic in 2009 and started his first company. With his team, he has developed leading ECG solutions, such as ECG Sim, and more recently, FDA cleared VIVO technology. Dr. Van Dam has worked at UCLA and currently has research collaborations with universities both in the United States and Europe. He has published numerous articles on inverse cardiac modeling and has filed 20 patents, which serve as the basis of the ECG Excellence technology. CineECG is the first product of ECG Excellence, which is a software designed to support physicians in ECG interpretation and will be the focus of our discussion today. Dr. Van Dam, what an honor to have you join us today to discuss your novel work. Thank you for joining.

Dr. Van Dam: Thank you very much also for the invitation. I'm very pleased to help understanding ECG through your platform, thank you.

Dr. Kashou: Well now, most of us are aware of the standard 12 lead ECG, as we use throughout our clinical days with patient care, but CineECG, this is brand new. Can you tell us a little bit what is actually CineECG?

Dr. Van Dam: CineECG is basically using the same information as every cardiologist does. It takes a 12 lead ECG and converts it into a 3D activation and recovery line, showing where the mean activation and recovery of the heart at a certain moment of the cardiac cycle is. So instead of doing a rhythm analysis, it only does the analysis of a single heartbeat, so it really does the analysis of the waveform, and that's absolutely new. Most ECGs are just analyzed pointwise, what's the amplitude, what's the range? CineECG tells you where does the activity take place inside the heart. So for instance, CineECG starts on the left, and then you go transeptal, which you normally have, and then moves back to the left, and then moves with repolarization towards the apex. Basically, identifying that the repolarization goes from apex to base, that's a normal

activation, which now every basically non-expert, every cardiologist, every general practitioner can see.

Dr. Kashou: It's really fascinating because the standard 12 lead, when we get it in clinical practice, or even now these home hardware devices that, whether it's your watch or different devices, we're seeing it kind of 2-dimensional. We're looking at the electrical signal from the heart in this 2D plane, but not really aligning it. And obviously, if you don't have an understanding of electrocardiography, you don't know how to relate that to the underlying heart and the anatomy. What you're saying, and correct me if I'm wrong, is that this allows us to look at how the heart is actually activated during the depolarization phase and during also the recovery phase. Is that kind of the main difference or how do you see it?

Dr. Van Dam: That's the absolute essential difference of CineECG and the ECG. It moves through the heart and not somewhere in 3D space, where you have to do this mental process and project the ECG on an imaginary virtual structure of the heart. This is what the program does for you.

Dr. Kashou: I can already see so many advantages to this, but where do you see the main advantages of using the CineECG compared to the current standard 12 lead ECG we use in clinical practice?

Dr. Van Dam: So we're building it at the moment, using it at the moment, especially for the general practitioners and the emergency docs, that's where we think it has the most value, where we help to define, this is a normal ECG or this is not a normal ECG. And also to classify where is the ST segment, which is identifying where is the ischemia located, 'cause the CineECG basically goes in the direction of late activation, and if you have ST elevation, that's something similar to late activation. So basically, CineECG tells you where the ischemia takes place, if that's left free wall, which is often also depression. So there is no, we don't talk about depression as STEMI or non-STEMI, we just talk this is where the CineECG is locating this ischemic area, somewhere in the heart, and that can be lateral, that can be inferior, it can be septal, it can be even on the right. CineECG will tell you this region. And the same for conduction disorders. If you have a left bundle, everybody recognizes basically the waveforms, but now with CineECG, left bundle means the conduction system on the left is broken, so where does the activation start? On the right, and that's exactly what you see with CineECG. You have an activation that starts on the right chamber and moves all the way to the left base, and then the repolarization dives back.

Dr. Kashou: It's so fascinating. Yeah, it's amazing. And I can imagine, as a learner, how helpful that could be, because I certainly struggled and still learning to this day how to interpret ECGs, but I can see how this could be such an added value, not only to the learner, but also in our clinical practice. Some of our EP physicians, you mentioned emergency medicine, there's so much potential use, and it's really fascinating. Now, I was wondering, and please add anything else that you'd like, but are there ways for us to explore the advantages of this technology ourselves?

Dr. Van Dam: Yes, we have also a website where you can upload already ECGs in a test phase. You need to have them in an electronic format, so not a pdf, and then you get a CineECG report

back. If you're really interested in using this in a clinical practice, we also, of course, provide services, but this is where you can already upload 10 ECGs, get a report back, and get feedback on your specific ECG.

Dr. Kashou: And what is that website that we can go to?

Dr. Van Dam: Www.cineecg.com.

Dr. Kashou: Oh, wow. Okay well, so www.cineecg.com, thank you. It's really amazing what we have here. I mean, the 12 lead ECG is critical to patient care. However, it seems like the patterns that we have to still uncover are still there, and that may actually have important clinical significance. The CineECG represents a novel means for us to better understand wavefronts in various pathologies, including myocardial ischemia, and I know you've done a lot in there. Dr. Van Dam, what incredible work you and your team are leading. It is just truly amazing. I look forward to watching your future work in this field unfold and just so much that that's left for you to do. I know you're super busy with all these new projects. On behalf of our team, thank you so much for taking your time outta your day to join us.

Dr. Van Dam: Thank you again. I really enjoyed this talk. I hope to be back with new inventions on this.

Dr. Kashou: Thank you.

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